



RESEARCH HIGHLIGHT

The Experiences of Canadian Homeowners Living in EQuilibrium™ Housing Net-Zero Energy Homes

July 2015 Technical Series

INTRODUCTION

There is a growing interest among builders, developers and consumers across Canada for homes and communities that are comfortable, affordable, energy-efficient and environmentally friendly. To help housing industry professionals meet this growing demand, Canada Mortgage and Housing Corporation (CMHC) launched its EQuilibrium™ Sustainable Housing Demonstration Initiative in May 2006. The goals of the initiative were to develop a clear vision and approach to developing and promoting healthy and sustainable “green” housing across Canada; increase the capacity of builders, developers, architects and engineers to design and build sustainable, healthy and environmentally friendly homes and communities; educate consumers on the benefits of owning a low-energy, sustainable home; and enhance Canada’s domestic and international leadership and business opportunities in sustainable housing design, construction services and technologies.

A total of 11 teams took part in the initiative, with each building a unique EQuilibrium™ Housing demonstration project in different parts of the country. Those projects were then sold or rented to people who wanted to minimize their environmental impact while giving their families a comfortable, healthy and attractive place to call home. Under the Initiative, CMHC provided support for design development, testing and evaluation, project documentation and performance monitoring so that the lessons learned and knowledge gained through the demonstration could be shared with industry and consumer audiences.

To better understand the extent to which the occupants of the EQuilibrium™ housing projects were satisfied with the performance of their unique and innovative homes, CMHC retained a survey firm to develop a questionnaire and conduct interviews. This Research Highlight summarizes the findings regarding the experiences of the occupants during their first year or more of living in their homes—including their feedback on the benefits, value and other considerations of living in a near- or net-zero energy sustainable home.

For more information on CMHC’s EQuilibrium™ Sustainable Housing Demonstration Initiative, visit www.cmhc.ca.

OBJECTIVES

The objectives of the research project included:

- identifying why homeowners/occupants chose to buy/rent a home constructed under the EQuilibrium™ Housing Initiative;
- understanding the initial expectations of homeowners/occupants who purchased/rented a home constructed under the EQuilibrium™ Housing Initiative;
- gaining feedback on the overall experience of homeowners/occupants after they have lived in their homes for a certain period of time;

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- understanding the features homeowners/occupants like the most and like the least, as well as challenges and surprises that came up since moving into their homes;
- assessing homeowners/occupants' level of knowledge with regard to sustainable housing technologies and features including operating and maintenance needs;
- ascertaining homeowner/occupant perceptions of specific benefits and costs of living in a sustainable home; and
- inquiring about what the homeowners/occupants would recommend to others and/or look for in a future home.

METHODOLOGY

CMHC commissioned Corporate Research Associates Inc. (CRA) to develop a questionnaire and conduct in-depth interviews with the homeowners or occupants of 12 of the completed EQuilibrium™ houses. All of the occupants had lived in their homes for at least one year, giving them ample opportunity to fully understand how their homes perform in every season.

Each interview lasted approximately one hour and was conducted at a time convenient to individual homeowners/occupants. During scheduling, participants were provided with the choice of a telephone or in-person interview. Discussions were conducted in either French or English, based on each individual's preference. To prepare for the discussion, participants were asked to complete a simple exercise before the scheduled interview. Where possible, all occupants involved in household decisions were asked to take part in the interview. In appreciation for participants' time and effort, and in accordance with industry standards, a small honorarium was provided to encourage and reward participation in the survey.

FINDINGS

The interviews proved to be highly informative regarding the perceptions that the homeowners and occupants had of living in some of the most sustainable houses ever constructed in Canada. Some of the key findings included the following:

Reasons for choosing a sustainable home

The occupants who participated in the study had a wide variety of reasons for choosing a sustainable home.

Nearly all of the homeowners and occupants described themselves as being "green" before they moved into an EQuilibrium™ home. Many of the participants also expressed an interest in sustainable housing principles, as well as a belief that sustainable homes would offer a number of advantages over standard homes, including:

- ongoing cost and energy savings;
- a higher level of comfort and quality;
- enhanced temperature controls;
- better indoor air quality;
- more natural light;
- more durable construction and finishings;
- less ongoing maintenance; and
- a smaller carbon footprint.

Despite this interest, however, most of the participants had only a vague idea of what sustainable housing really entailed before they purchased an EQuilibrium™ home. In addition, nearly all of the participants said that features like lifestyle, location or the style of the home were more important deciding factors for them than either sustainability or environmental impact.

Financial considerations also played a relatively unimportant role in the choice of a sustainable home, with most of the participants feeling that the higher purchase price would be offset by lower energy costs over time. Several of the homeowners also said that the purchase price of their sustainable home was comparable to the prices of more traditional homes in the same neighbourhoods.

The experience of living in a sustainable home

After one year of living in EQUilibrium™ houses, nearly all of the homeowners and occupants stated that they were overwhelmingly satisfied with their homes.

All of the participants felt comfortable with the technology installed in their homes, even though they had varying degrees of familiarity with the different systems. Many of them particularly appreciated the energy usage reporting systems, which allowed them to keep track of their home's overall performance.

For the majority of participants, the most appreciated features included:

- better comfort and an improved lifestyle;
- the availability of ample natural light throughout the home;
- superior insulation and soundproofing from home design and triple- and quadruple-pane windows;
- the ability to control the home's temperature using natural light and ventilation;
- high-quality floor, wall and ceiling insulation;
- heating and ventilation systems that provide a comfortable level of humidity and prevent the growth of mold;
- better indoor air quality with less dust and fewer allergic reactions;
- durable and low-maintenance construction; and
- an efficient layout that maximizes usable living space and creates a spacious, esthetically pleasing environment.

Several occupants did report some issues with their homes, though most of the problems were experienced by only one or two of the participants. These included:

- issues with the performance, convenience or noise levels of solar thermal pumps, rooftop heat recovery systems and solar hot water systems;
- difficulty cooling the home during the warm summer months without having to keep the windows open;
- lack of barrier-free features across the home;
- unattractive landscaping;
- odours from the greywater recycling system used in the bathrooms;
- lack of a secondary heating source in case of an electric power outage;
- the cost of geothermal technology compared to natural gas;
- radio interference with the master "on/off" switch;
- overflows from the rainwater harvesting system; and
- overly complex automation systems for simple functions like dimming the lights.

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For nearly all of the issues identified by the participants, one of the greatest challenges was finding a supplier who could fix the problems, especially if the original installer had gone out of business. One of the homeowners was also worried that it might not be possible to carry out simple maintenance or repairs to some of the more advanced systems without a costly service call.

The long-term value of owning a sustainable home

Although most of the homeowners believed that the upfront purchasing cost was higher for a sustainable home than for a standard house, the difference in price wasn't significant enough to impact their decision. In addition, almost all of the participants felt that the lower operating costs for a sustainable home would more than pay for the difference in purchase price over the long term.

A few of the homeowners, however, felt that the sustainability features wouldn't dramatically increase the resale value of their homes, given the need to find buyers who are informed about the advantages of "green" housing and because the technology that makes their homes so efficient will likely become more affordable as the demand for sustainable housing continues to grow.

Overall opinions of homeowners/occupants about sustainable housing

For the most part, the homeowners and occupants indicated that, while their outlook on sustainable housing has not changed significantly since moving into an EQuilibrium™ home, the experience has given them a better appreciation of

how sustainable construction can not only enhance the efficiency and quality of their home but also improve their family's overall quality of life.

All of the participants stated that they would overwhelmingly recommend a sustainable home to their family and friends. In addition, nearly all of the participants said that they would consider buying another sustainable home if they needed to move.

CONCLUSIONS

Among other conclusions, the study suggests the following:

- The choice to purchase or live in a sustainable home is primarily driven by the location of the home and the quality of the living environment. While all of the occupants expressed a concern for the environment, sustainability often came second to such factors as comfort, location, layout and quality of life when choosing a home.
- Despite varying degrees of knowledge before moving in, the homeowners and occupants reported a heightened concern for reducing their environmental footprint after living in an EQuilibrium™ home. Most of the homeowners were not very familiar with sustainable buildings before they decided to purchase one, so many turned to their builder, suppliers or CMHC for more information. After moving in, most occupants became more conscious of their environmental footprint.
- Virtually all of the occupants were highly satisfied with the experience of living in a sustainable home. In nearly all cases, the comfort delivered by a sustainable home far

exceeded homeowner/occupant expectations, particularly in terms of the amount of natural daylighting, sound insulation, ventilation, and the ability to control the temperature in the home.

- The cost of purchasing or building a sustainable home is not prohibitive, even if it is higher than for other types of residential construction. Most of the homeowners also recognized that the upfront cost of building or purchasing a sustainable home would be offset by lower energy bills over time.
- The most successful and appealing homes were those that used simple sustainable building technologies to improve comfort and living conditions. The homeowners all agreed that they would recommend sustainable housing to friends and relatives, and that they would look for another sustainable house if they had to move. The findings also suggest that there may be a significant market for homes that use relatively simple sustainability systems and features to improve the level of comfort for occupants, while remaining easy to operate and maintain.

IMPLICATIONS FOR THE HOUSING INDUSTRY

The results of this research project speak to the relatively wide range of value propositions that sustainable housing can represent to consumers. The interviews suggest that it would be a mistake to focus on any one element of sustainable housing (for example, energy savings), as there are many other benefits that may be of equal or higher value to prospective homebuyers. The results of the survey also confirm that the complexity of some more advanced technologies can be of concern to homeowners and that more simple approaches may yield more benefits over the longer term.

For more information about the CMHC EQUilibrium™ Sustainable Housing Demonstration Initiative, visit www.cmhc.ca/equilibriumhousing. A copy of the full research report—*CMHC EQUilibrium™ Housing Homeowner/Occupant Qualitative Research Project*—is also available from the Canadian Housing Information Centre (CHIC) at Canada Mortgage and Housing Corporation.

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The Experiences of Canadian Homeowners Living in Equilibrium™ Housing Net-Zero Energy Homes

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Housing Research at CMHC

Under Part IX of the *National Housing Act*, the Government of Canada provides funds to CMHC to conduct research into the social, economic and technical aspects of housing and related fields, and to undertake the publishing and distribution of the results of this research.

This Research Highlight is one of a series intended to inform you of the nature and scope of CMHC's research.

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Printed in Canada
Produced by CMHC

21-07-15

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